Remarks

Claims 1 – 22, 42, and 43 have been pending. Claims 23 - 41 have been cancelled. Claims 4 – 6 are being canceled. Claims 1, 42, and 43 are being amended.

Applicants are hereby amending claim 1 to limit the polyacrylate component of the curable adhesive composition to polyacrylates containing acrylic acid (basis therefor can be found, for example, at page 7, lines 19 – 28, and in the examples). Claims 4 – 6 are thus being cancelled. Claim 1 is also being amended to clarify that a curable adhesive composition that exhibits properties of a pressure sensitive adhesive is being claimed (basis therefor can be found, for example, at page 2, lines 28 – 30, and at page 6, line 15).

Claims 42 and 43 are being amended to clarify that an optical element is being claimed (basis therefor can be found, for example, at page 3, lines 29 – 31, and at page 4, lines 23 – 30). Claim 43 is also being amended to comply with the description in the specification of outgassing layers comprising at least one of polycarbonate or polyacrylate (basis therefor can be found, for example, at page 17, lines 7 – 10).

Rejections Under 35 USC Section 112

Claims 1 – 22, 42, and 43 were rejected under Section 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention because it was unclear if an article, a layer, or an adhesive composition was being claimed. Claim 1 has been amended to clarify that an adhesive composition is being claimed, and claims 42 and 43 have been amended to clarify that an optical element is being claimed.

Claim 43 was rejected under Section 112, first paragraph, as failing to comply with the written description requirement. Claim 43 has been amended to conform to Applicants' written description.

Thus, the rejections under Section 112 have been obviated by the amendments, and Applicants therefore respectfully request that the rejection be withdrawn.

Rejections Under 35 USC Section 103

Claims 1 – 3, 8 – 14, 21 – 22, and 42 - 43 were rejected under Section 103(a) as being unpatentable over U.S. Patent No. 5,897,727 (Staral et al.) and optionally at least one of U.S. Patent No. 6,088,079 (Kameyama et al.) and Japan 10-120994 (JP '994). The rejection is respectfully traversed for the following reasons.

Staral discloses a pressure sensitive crosslinkable adhesive comprising (1) at least one polymer obtained from polymerization of at least one free-radically polymerizable monomer, (2) at least one cationically polymerizable monomer, (3) a photo-activatable catalyst system, and (4) optionally, a monohydric or polyhydric alcohol.

Kameyama discloses a pressure sensitive adhesive having stress-relaxing properties for uniting a cholesteric crystal polymer layer with other optical elements to form an optical element. The pressure sensitive adhesive preferably comprises an acrylic polymer from the standpoint of optical transparency and pressure sensitive adhesive properties.

JP '994 discloses a low haze, curable adhesive comprising an adhesive polymer, an epoxy group-containing resin, and a compound for inducing the ring-opening reaction of the epoxy groups.

Applicants disclose a curable adhesive composition comprising (1) polyacrylate component containing acrylic acid, (2) epoxy component, and (3) cationic initiator. When uncured, Applicants' curable adhesive composition exhibits properties of a pressure sensitive adhesive and is optically clear such that the luminous transmission of the composition is greater than 90%, the haze of the composition is less than 2%, and the opacity of the composition is less than 1%. The uncured, curable adhesive can be cured to form an adhesive comprising an interpenetrating polymer network, wherein after aging the cured adhesive at 90°C for 500 hours the luminous transmission of the cured and aged adhesive is greater than 90%, the haze of the cured and aged adhesive is less than 2%, and the opacity of the cured and aged adhesive is less than 1%.

The Examiner has asserted that it would have been obvious to provide the polyacrylate component, epoxy component and cationic initiator of Staral so as to have the claimed properties since Staral, directed to optical elements, teaches formulating the adhesive for preparing an

optical element such that the adhesive is optically clear and has "little optical haze" before or after curing. The Examiner has further asserted that the optional teaching in Kameyama to obtain optical transparency in a pressure sensitive adhesive by using a polyacrylate component and the optional JP '994 teaching to lower haze in a pressure sensitive adhesive by using appropriate amounts of polyacrylate component and epoxy component provide ample guidance as to how to obtain the claimed optical clarity.

Applicants' curable adhesive composition comprises a polyacrylate component containing acrylic acid. The acrylic acid acts as a reactive functional group to connect the polyacrylate to the epoxy component and create an inter-reacted interpolymer network. (See, page 7, lines 19 – 28.) However, Neither Staral, Kameyama, nor JP '994 appears to teach or suggest a curable adhesive composition comprising a polyacrylate component containing acrylic acid. The references appear to disclose adhesive compositions comprising only a polyacrylate component derived from acrylic acid monomer. In fact, JP '994 appears to teach away from using polymers containing acrylic acid (see paragraph 34).

In addition, Applicants' adhesive composition exhibits unexpected properties. "Often, components of an optical element, or other adjacent components, can adversely affect the stability, clarity, bond strength, or other performance property of an adhesive in the same optical element. Polycarbonates, for example, are known to outgas, producing bubbles or partial or full delamination at the adhesive bond between the polycarbonate and another layer of an optical element. Bubbling and delamination can be particularly common when the outgassing layer is bonded to another layer or laminate that exhibits low vapor transmissivity. Bubbles and delamination can affect clarity and integrity of the optical element, and must be avoided." (See, for example, page 2, lines 3 – 12).

Applicants' adhesive composition can be optically transmissive and can maintain a structural integrity to resist combined effects such as outgassing and low moisture vapor transmission (page 4, lines 10 – 12). It can be used for bonding materials that tend to outgas, and where such outgassing tends to compromise integrity of an adhesive bond between the outgassing material and another material. More specifically, Applicants' adhesive composition can be used to bond an outgassing material to a material that has a low moisture vapor transmission rate (page 4, lines 26 – 30).

In addition, Applicants' adhesive composition is optically clear in both its uncured and cured state. The adhesive can also maintain its optical clarity over a useful period of time, as shown by accelerated aging tests in which the adhesive was aged at 90°C for 500 hours.

Neither Staral, Kameyama, nor JP '994 appears to teach or suggest an adhesive composition that can be used for bonding materials that tend to outgas, or to bond an outgassing material to a material that has a low moisture vapor transmission rate. Furthermore, none of the references appear to teach or suggest how to make such an adhesive.

In addition, neither Staral, Kameyama, nor JP '994 appears to teach or suggest how to make an adhesive that has optical clarity (that is, luminous transmission greater than 90%, haze less than 2%, and opacity less than 1%) before curing and after curing and aging at 90°C for 500 hours. Staral states that its adhesives are "optically clear" (column 6, lines 18 – 23). Staral provides no indication, however, that its adhesives are optically clear after aging at 90°C for 500 hours. Kameyama's pressure sensitive adhesive does not even appear to be a curable adhesive, and therefore provides no guidance on making an adhesive that has optical clarity before curing and after curing and aging. JP '994 teaches curable adhesives with low haze only before curing, and does not appear to teach or disclose how to make a curable adhesive that is optically clear after curing and aging at 90°C for 500 hours.

Thus, Staral and optionally at least one of Kameyama and JP '994 do not appear to teach or suggest Applicants' claimed invention. Applicants' invention is therefore unobvious and patentable over the references, and Applicants respectfully request that the rejection under Section 103(b) based thereon be withdrawn.

Claims 4 – 7 were rejected under Section 103(a) as being unpatentable over Staral et al. and optionally at least one of Kameyama et al. and JP '994 as applied above and further in view of U.S. Patent No. 6,319,603 (Komiya et al.). The rejection is respectfully traversed for the following reasons.

Komiya discloses a curable resin composition comprising (1) a (meth)acrylate polymer, (2) ring-opening polymerizable monomer containing at least one epoxy group, and (3) a cationic photopolymerization initiator.

The Examiner has asserted that it would have been obvious to one of ordinary skill in the art to provide the polyacrylate component in Staral's pressure sensitive adhesive such that it

reacts with the epoxy component since Komiya suggests forming the poly(meth)acrylate polymer functional group such that a grafting reaction between the poly(meth)acrylate polymer and the epoxy component is obtained and so that the resulting adhesive undergoes the least change in characteristics when exposed to heat and light and maintains its transparency.

As discussed above, neither Staral, Kameyama, nor JP '944 appear to teach or suggest an adhesive composition (1) comprising a polyacrylate component containing acrylic acid, (2) that can be used for bonding materials that tend to outgas, or to bond an outgassing material to a material that has a low moisture vapor transmission rate, or (3) that has optical clarity (that is, luminous transmission greater than 90%, haze less than 2%, and opacity less than 1%) before curing and after curing and aging at 90°C for 500 hours. Komiya does not appear to teach or suggest any of these things either.

Komiya discloses using (meth)acrylate compounds containing an epoxy group as one of the reactants in the manufacture of its poly(meth)acrylate polymer, so that the polymer comprises epoxy groups for the purpose of accelerating the grafting reaction between the ring-opening polymerizable monomer-containing an epoxy group and the poly(meth)acrylate polymer during the final cure (see, for example, column 3, lines 38 – 47). Such epoxy acrylates are different than Applicants' polyacrylates containing acrylic acid. Epoxy acrylates disclosed as an alternative to polyacrylates containing acrylic acid in Applicants' specification (see page 7, lines 28 – 31).

In view of the foregoing, Applicants' invention is unobvious and patentable over Staral and optionally one of Kameyama and JP '994 as applied above and further in view of Komiya and Applicants therefore respectfully request that the rejection under Section 103(a) based thereon be withdrawn.

Claims 7, 15, and 17 20 were rejected under Section 103(a) as being unpatentable over Staral et al. and optionally at least one of Kameyama et al. and JP '994 as applied above and further in view of U.S. Patent No. 6,180,200 (Ha et al.). The rejection is respectfully traversed for the following reasons.

Ha discloses "cationic and hybrid radiation-curable pressure sensitive adhesive compositions for digital versatile discs."

With respect to claims 18 – 20, the Examiner has asserted that it would have been obvious to use the claimed multifunctional acrylate in Staral's pressure sensitive adhesive composition since

(1) Staral teaches that the pressure sensitive adhesive may be applied by any appropriate liquid application method such as screen coating and (2) Ha suggests using an acrylate monomer in a hybrid adhesive to provide a suitable viscosity for screen printing.

Applicants are perplexed by the Examiner's comments because claims 18 – 20 are directed to compositions of the invention comprising a crosslinker. Nonetheless, Applicants will address the rejection.

As discussed above, neither Staral, Kameyama, nor JP '944 appear to teach or suggest an adhesive composition (1) comprising a polyacrylate component containing acrylic acid, (2) that can be used for bonding materials that tend to outgas, or to bond an outgassing material to a material that has a low moisture vapor transmission rate, or (3) that has optical clarity (that is, luminous transmission greater than 90%, haze less than 2%, and opacity less than 1%) before curing and after curing and aging at 90°C for 500 hours.

Ha does not appear to teach or suggest any of these things either. Furthermore, one skilled in the art of hybrid adhesives (that is, adhesives which can exhibit properties of a pressure sensitive adhesive in combination with a curable structural adhesive) would not look to Ha for guidance. Ha describes its adhesives as "cationic and hybrid radiation-curable pressure sensitive adhesive compositions." Ha appears to use the term "hybrid" in a different manner than Applicants. Ha's adhesive appears to be a "hybrid" because it is delivered as a liquid syrup and then irradiated so that the epoxy cures to provide the final pressure sensitive adhesive strength. Ha's adhesive appears to remain a pressure sensitive adhesive.

In addition, although Ha describes its adhesive as having "high optical transparency," there is no indication as to what is considered high optical transparency. Ha uses pressure sensitive adhesive to bond opaque substrates together for digital versatile discs (DVDs). Such an application does not generally require the optical clarity described by Applicant.

Therefore, claims 18 – 20 are unobvious and patentable over Staral and optionally one of Kameyama and JP '994 as applied above and further in view of Ha.

Furthermore, for all of the reasons discussed above with respect to claims 18 20, claims 17, 7, and 15 are also unobvious and patentable over the combined references. The epoxy acrylate oligomer disclosed in Ha does not appear to contain acrylic acid that can act as a reactive

functional group to connect the polyacrylate to the epoxy component and create an inter-reacted interpolymer network.

In view of the foregoing, Applicants' invention is indeed unobvious and patentable over Staral and optionally one of Kameyama and JP '994 as applied above and further in view of Ha and Applicants therefore respectfully request that the rejection under Section 103(a) based thereon be withdrawn.

Claims 15 and 16 were rejected under Section 103(a) as being unpatentable over Staral et al. and optionally at least one of Kameyama et al. and JP '994 in view of U.S. Patent No. 5,773,485 (Bennett et al.). The rejection is respectfully traversed for the following reasons.

Bennett discloses a syrup, curable to a crosslinked viscoelastic material comprising solute polymers and solvent monomer mixtures based, in substantial part, on free radically-polymerizable ethylenically unsaturated monomers.

The Examiner has asserted that it would have been obvious to include acryloxy benzophenone in the pressure sensitive adhesive composition of Staral in view of Bennett's teaching to use it to provide adhesive with high shear strength.

As discussed above, neither Staral, Kameyama, nor JP '944 appear to teach or suggest an adhesive composition (1) comprising a polyacrylate component containing acrylic acid, (2) that can be used for bonding materials that tend to outgas, or to bond an outgassing material to a material that has a low moisture vapor transmission rate, or (3) that has optical clarity (that is, luminous transmission greater than 90%, haze less than 2%, and opacity less than 1%) before curing and after curing and aging at 90°C for 500 hours.

Bennett does not appear to teach or suggest any of these things either. Therefore Applicants' invention is indeed unobvious and patentable over Staral and optionally one of Kameyama and JP '994 as applied above and further in view of Bennett and Applicants therefore respectfully request that the rejection under Section 103(a) based thereon be withdrawn.

Concluding Remarks

In view of the above, Applicants believe that the application is now in condition for allowance. Therefore, reconsideration and allowance of Applicants' claims are respectfully requested.

Respectfully submitted,

June 7, 2004
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